1997. ABSTRACT. Page 84 in 1997 Wetlands Heritage and Stewardship. Society of Wetland Scientists 18th Annual Meeting (June 1-6, 1997, Bozeman, Montana).

LINZ, GEORGE M.[1], Dage C. Blixt [2], David L. Bergman[1], H. Jeffrey Homan [1] and William J. Bleier[2]. [1]U.S. Department of Agriculture, 2301 University Drive, Bldg. 23B, Bismarck, ND 58504. [2] Department of Zoology, Stevens Hall, NDSU, Fargo, ND 58105 --**Response of ducks, terns, and blackbirds to glyphosate-induced habitat alterations in wetlands.**

In the northern Great Plains, cattails *Typha* spp. have overgrown many wetlands, contributing to the decline of some bird species. In 1990 and 1991, we assessed the effects of herbicide-induced changes in cattails on densities of birds in northeastern North Dakota. We randomly assigned 17 cattail-dominated wetlands to 0% (controls), 50%, 70%, or 90% areal spray coverages with glyphosate herbicide. Wetland sizes and coverages of open water, live cattails, and dead cattails were determined from aerial photographs using geospatial processing software. From 2-18 June 1991-1993, wetlands were visited in random order between local sunrise and 5-hr post-sunrise by two observers. We recorded birds observed during six minutes at eight count points established at uniform intervals around the perimeter of each wetland. Median size of the experimental wetlands was 7.0 ha (range = 2.7 - 41.8 ha). During the two posttreatment years, percent coverages of open water (Wilcoxon tests, $P = 0.02$) and dead cattails ($P < 0.01$) were greater in the sprayed wetlands than in the reference wetlands. The coverage of live cattails was greater in the reference wetlands than in the sprayed wetlands ($P < 0.01$). During the two posttreatment years (averaged), densities of blue-winged teal *Anas discors*, northern shovelers *A. clypeata*, northern pintails *A. acuta*, and ruddy ducks *Oxyura jamaicensis* differed between treatments (Wilcoxon tests, $P < 0.10$), with more birds in the sprayed wetlands than in the reference wetlands. There were fewer red-winged blackbirds *Agelaius phoeniceus* in the sprayed wetlands than in the reference wetlands ($P < 0.10$). Median density of black terns *Childonias niger*, mallards *A. platyrhynchos*, gadwalls *A. strepera*, redheads *Aythya americana*, and yellow-headed blackbirds *Xanthocephalus xanthocephalus* did not differ among treatments ($P > 0.10$). During the posttreatment years, black tern numbers correlated positively with hectares of open water ($P < 0.1$) and dead cattails ($P < 0.1$). Numbers of yellow-headed blackbirds correlated positively with hectares of live cattails ($P < 0.1$) whereas, numbers of red-winged blackbirds were correlated positively with percent live cattails ($P < 0.05$) and negatively with percent dead cattails ($P < 0.01$). All seven duck species numbers were correlated positively with both percent ($P < 0.1$) and hectares ($P < 0.1$) of open water and negatively with percent coverage of live cattails ($P < 0.1$). Three of the seven duck species (blue-winged teal, northern shoveler, northern pintail) were correlated positively with both percent ($P < 0.1$) and hectares ($P < 0.05$) of dead cattails. Mallards ($P < 0.01$) and redheads ($P < 0.05$) were correlated positively with hectares of dead cattails. Results of this study suggest that ducks and black terns were positively influenced by the herbicide treatments, whereas, red-winged blackbirds were negatively affected. We recommend that wetlands contain equal amounts of open water, live cattails and dead cattails to maximize bird abundance.